Exercise 4
Keynesian Cross and Fiscal Policy

1. Answer the following questions.
1.1 Suppose Govt Multiplier is 5 and $\Delta G = 5$. Find ΔY.
1.2 Suppose Tax Multiplier is -3 and $\Delta Y = -9$. Find ΔT.
1.3 Suppose $\Delta Y = 10$ and $\Delta I = 2$. Find Investment Multiplier.

1.1 Goverment multiplier $= \frac{\Delta y}{\Delta G}$

$\Delta G = 5$

$\Delta y = \frac{\Delta y}{5} = 5$

$\Delta y = 25$ #

1.2 Tax multiplier

$\because \Delta y = -9$

$\therefore$ tax multiplier $= \frac{\Delta y}{\Delta T} = -3$

$\frac{(-9)}{\Delta T} = -3$

$\Delta T = 3$ #

1.3 Investment multiplier $= \frac{\Delta y}{\Delta I}$

Given = $\Delta y = 10$
$\Delta I = 2$

$\therefore$ investment multiplier $= \frac{10}{2} = 5$

2. From Y = C + I + G where $C = C_0 + C_1(Y – T)$, find
2.1 Equilibrium Output Y*
2.2 $\Delta Y/\Delta I$
2.3 $\Delta Y/\Delta G$
2.4 $\Delta Y/\Delta T$
2.5 Balanced-Budget Multiplier (BBM)
2.6 Explain what the BBM is.

2.1 Find y^*

$AE = C + I + G$
$AE = C_0 + C_1(y - T) + I + G$
$AE = C_0 + C_1 y - C_1 T + I + G$
$y^* = C_0 + C_1 y^* - C_1 T + I + G$
$(1 - C_1) y^* = C_0 - C_1 T + I + G$
$y^* = \frac{C_0 + C_1 T + I + G}{1 - C_1}$

2.2 Find $\frac{\Delta y}{\Delta I}$

$AE = C + I + G$
$AE = C_0 + C_1(y - T) + I + G$
$AE = C_0 + C_1 y - C_1 T + I + G$
$AE = (C_0 - C_1 T + I + G) + C_1 y$

As I is injection $\frac{\Delta y}{\Delta I} = \frac{1}{1 - \text{slope of AE}}$

2.3 $\dfrac{\Delta y}{\Delta G}$

$AE = C + I + G$

$AE = C_0 + C_1(y - T) + I + G$

$AE = (C_0 - C_1 T + I + G) + C_1 y$

As G is injection, $\dfrac{\Delta y}{\Delta G} = \dfrac{1}{1 - \text{slope of } AE}$

2.4 Find $\dfrac{\Delta y}{\Delta T}$

as T is leakage, $\dfrac{\Delta y}{\Delta T} = \dfrac{-MPC}{1 - \text{slope of } AE}$

$AE = C + I + G$

$AE = (C_0 - C_1 T + I + G) + C_1 y$

2.5 BBM

$$\frac{\Delta y^*}{\Delta G} + \frac{\Delta y^*}{\Delta T} = \frac{1 - C_1}{1 - C_1}$$

2.6 BBM is a change in aggregate output when both G and T increase by 1 unit.

3. Assume a closed economy with government. The country has the following components of aggregate expenditure.

$C = 300 + 0.75(Yd)$ $I = 50$

$G = 50$ $T = 50$ (lump-sum tax)

3.1 Use the Y = AE (standard) approach to find the equilibrium output.

3.2 Draw the Keynesian Cross, and find the intercept on the vertical axis and the slope of the AE schedule.

3.3 Use the Leakage = Injection (or saving/investment) approach to find the equilibrium level of output.

(Hint: the equilibrium condition is S + T = I + G, with Yd= Y – T = C + S)

3.4 Draw the saving/investment curve to show the equilibrium.

3.5 Suppose that the government decides to build more roads, raising government spending by 50 units, but this project is to be financed by the increase in net taxes of 50 units. Use the Y = AE (standard) approach to find the new equilibrium output.

3.6 Use the Balanced-Budget Multiplier (BBM) derived from Question 2.5 to find the new equilibrium output.

3.1

$Y = AE$

$AE = C + I + G$

$Y = C + I + G$

$Y = C_0 + c_1(Y - T) + I + G$

$Y = 300 + 0.75(Y) - 37.5 + 50 + 50$

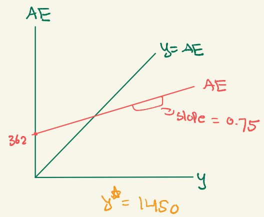
$Y - 0.75Y = 362.5$

$0.25Y = 362.5$

$Y^* = 1450$

$\boxed{Y = 362 + 0.75Y}$

3.2



3.3

$S + T = I + G$ (leakage injection)

$Y - T = C + S$ (saving function)

$Y - C = S + T$

$Y - C = I + G$

$Y - C = 50 + 50$

$Y - C = 100$

$Y - (300 + 0.75Yd) = 100$

$Y - (300 + 0.75(Y - 50)) = 100$

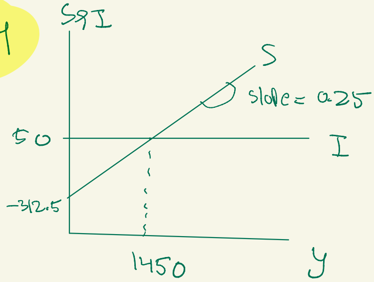
$Y - (300 + 0.75Y - 37.5) = 100$

$Y - 300 - 0.75Y + 37.5 = 100$

$0.25Y = 362.5$

$Y^* = 1450$

3.4



$Y_d = C + S$

$Y - T = C + S$

$Y - 50 = 300 + 0.75(Y - 50) + S$

$S = -300 - 0.75Y + 37.5 + Y - 50$

$S = -312.5 + 0.25Y$

3.5

$Y = AE$

$AE = C + I + G$

$Y = C + I + G$

$Y = 300 + 0.75(Y - 100) + 50 + 50$

$= 300 + 0.75Y - 75 + 150$

$Y = 375 + 0.75Y$

$Y = 375 + 0.75Y$

$0.25Y = 375$

$Y = 1500$ #

3.6

$$BBM = \frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta T}$$

∵ If the government spending and lum-sum tax increase by 1, income will increase by 1.

∴ Therefore, in order to build more road, Government increase their spending by 50, and lum-sump tax increase by 50, so the equlibrium output will increase by 50

$1450 + 50$

$= 1500$ #

4. From Y = C + I + G + (X – M)
where C = C0 + C1(Y – T) and M = M0 + M1(Y), find
4.1 Equilibrium Output Y*
4.2 ΔY/ΔI
4.3 ΔY/ΔG
4.4 ΔY/ΔT
4.5 Balanced-Budget Multiplier (BBM)

4.2

$$y^* = (c_0 - c_1 T + I + G + X - m_0) \times \frac{1}{1 - c_1 + m_1}$$

$$\frac{\Delta y}{\Delta I} = \frac{1}{1 - c_1 + m_1}$$

4.1

$$y = C + I + G + (X - m)$$

$$y = c_0 + c_1(y - T) + I + G + X - (m_0 + m_1 y)$$

$$y = c_0 + c_1 y - c_1 T + I + G + X - m_0 - m_1 y$$

$$(1 - c_1 + m_1) y = c_0 - c_1 T + I + G + X - m_0$$

$$y^* = (c_0 - c_1 T + I + G + X - m_0) \times \frac{1}{1 - c_1 + m_1}$$

4.3

$$y^* = (c_0 - c_1 T + I + G + X - m_0) \times \frac{1}{1 - c_1 + m_1}$$

$$\frac{\Delta y}{\Delta G} = \frac{1}{1 - c_1 + m_1}$$

4.4

$$y^* = c_0 - c_1 T + I + G + X - m_0) * \frac{1}{1 - c_1 + m_1}$$

$$\frac{\Delta y}{\Delta T} = \frac{-c_1}{1 - c_1 + m_1}$$

4.5

BBM

$$\frac{\Delta y}{\Delta G} + \frac{\Delta y}{\Delta T} = \frac{1 - c_1}{1 - c_1 + m_1}$$

5. Assume an open economy with government. The country has the following components of aggregate expenditure.

$C = 200 + 0.7(Yd)$ $I = 75$ $G = 75$

$T = 50$ $X = 50$ $M = 50 + 0.1Y$

5.1 Use the Y = AE approach to find the equilibrium. Is Y = 300 an equilibrium? If it is not, explain the adjustment process towards equilibrium.

5.2 Based on what you have derived in Question 4, calculate the investment, government spending, tax, and balanced-budget multipliers.

5.3 Interpret the value of each of the multipliers.

Suppose that the full-employment output (Y_F) is 600;

5.4 What type of output gap is the economy currently experiencing?

5.5 Draw the Keynesian Cross. Identify its slope and intercept. Also, illustrate the output gap.

Now, government wants to correct the output gap by moving the economy to the full-employment level, and is considering different policies.

(Hint: use the multipliers from Question 5.2 to answer the following questions)

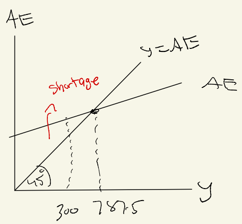
5.6 If the government wants to adjust **only its spending (G)**, how much G should be changed?

5.7 If the government wants to adjust **only its net taxes (T)**, how much T should be changed?

5.8 If the government wants to boost **only investment (I)**, how much I should be changed?

5.9 If the government wants to implement a balanced-budget policy, what should the government do with G and T?

5.1



$Y = AE$

$AE = C+I+G+X-M$

$Y = 200 + 0.7(Y-50) + 75 + 75 + (50 - 50 - 0.1Y)$

$Y = 200 + 0.7Y - 35 + 75 + 75 + 50 - 50 - 0.1Y$

$Y = 0.6Y + 315$

$1 - 0.6Y = 315$

$0.4Y = 315$

$Y^* = 787.5$

$C = 200 + 0.7(Yd)$ → MPC

$M = 50 + 0.1Y$ → MPM

5.2

Government spending & investment multiplier

$$= \frac{1}{1 - \text{slope of AE}}$$

slope of AE $\rightarrow$ mpc + mpm

$$= \frac{1}{1-0.7+0.1}$$

$= 2.5$ #

Tax multiplier $= \dfrac{-mpc}{1 - \text{slope of AE}}$

slope of AE $\rightarrow$ mpc + mpm

$$= \frac{-0.7}{1-0.7+0.1} = -1.75$$ #

BBM =

multiplier of G + Tax $= 2.5 - 1.75$

$= 0.75$ #

5.3

$\frac{\Delta y^*}{\Delta I}$ = when investment increase by 1 unit, output will increase by 2.5

$\frac{\Delta y^*}{\Delta G}$ = when government spending increases by 1 unit, output will increase by 2.5

$\frac{\Delta y^*}{\Delta T}$ = when government spending and tax increase equally by 1 unit, output will increase by 0.75

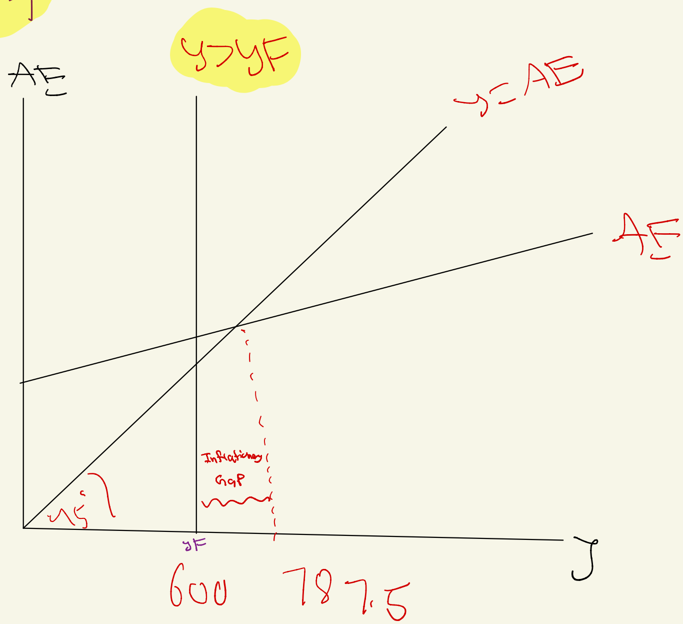
Inflationary gap =

$y > y_F$ ← Produced too much

Recessionary gap =

$y < y_F$ Produced too little.

5.4

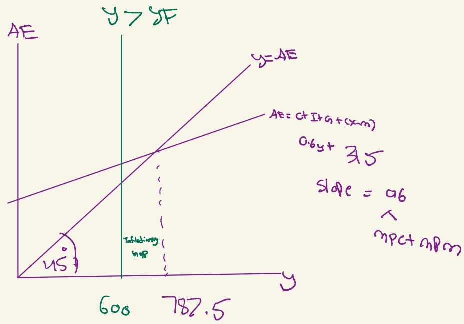


This is when you produced over your capacity so we are in inflationary gap.

In this case, goverment will have to use contractionary policy (stabalize economy) which is cut goverment spending and raise tax to slow down economy to be y = yF.

goals.

5.5



5.6

$$\frac{\Delta y^*}{\Delta G} = 2.5$$

[illegible] ΔG

$$\Delta G = \frac{-187.5}{2.5} = -75$$

change in output

5.7

$$\frac{\Delta y^*}{\Delta T} = -1.75$$

$$\Delta T = \frac{-187.5}{-1.75}$$

$= 107.142$ ₭

tax [illegible]

[illegible] inflationary tax ↑

5.8

$$\frac{\Delta y^*}{\Delta I_p} = 2.5$$

$$\Delta = \frac{-187.5}{2.5} = -75$$

5.9

BBm = 0.75

multiplier of G + T

$$\frac{-187.5}{0.75} = -250$$ ₭

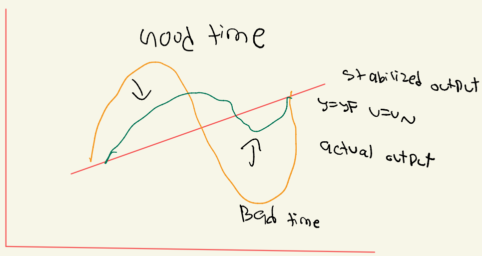
decrease both government and tax by 250!)

6. Explain the role of Import as an automatic stabilizer. If the government wants to further stabilize the economy, is there anything that the government can do with its tax system? Explain.

Automatic stabilizer → component in AE to stabilize the GDP

Import / income-tax are automatic stabilizer

Role of automatic stabilizer is reduce the fluctuation of economy.



During good time → High Y, AE

So government raise tax (T) and import (m) to reduce people income (Y) which helps to slow down the economy during peak times.

During bad time → Low Y, AE

So the government reduce tax (T) and import (m) to increase people income (Y) which helps to boost economy during economics recession.

7. Let S = -200 + 0.5Y and I = 50, be the saving function and investment.

7.1 Use the saving/investment approach to find the equilibrium output.
7.2 Find the equilibrium saving. (Hint: substitute Y* into S)

Suppose people decide to save more, <u>increasing autonomous saving by 100</u>.

7.3 Use the saving/investment approach to find the new equilibrium output.
7.4 Find the new equilibrium saving. (Hint: substitute new Y* into S)
7.5 Comment on your result.

7.1

$S = I$

$-200 + 0.5y = 50$

$0.5y = 200 + 50$

$0.5y = 250$

$y^* = 500$ #

7.2 → Subsitute y^* into S

Saving $= -200 + 0.5(500)$

$= -200 + 250$

$S^* = 50$ #

7.3 new saving:

$-200 + 0.5y + 100$

$= -100 + 0.5y$

Due to $S = I$

$-100 + 0.5y = 50$

$0.5y = 150$

$y^* = 300$ #

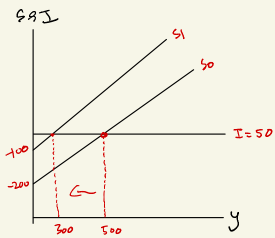
7.4 new equilibrium of saving

$= -100 + 0.5(300)$

$= -100 + 150$

$S^* = 50$ #

7.5



→ Paradox of thrift → This leads to decreasing in aggregate output and aggregate expenditure.

When people intend to save more money, there will be leakage. People will spend less and less G&S will be produced by firms. and income in the economy will fall and therefore, you can save less.